UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,194	04/20/2007	Michael Sudakov	062918	1055

38834 7590 03/24/2009

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER	
LOGIE, MICHAEL J	

ART UNIT	PAPER NUMBER
2881	

MAIL DATE	DELIVERY MODE
03/24/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,194	SUDAKOV ET AL.	
	Examiner	Art Unit	
	MICHAEL J. LOGIE	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 14-20* is/are rejected.

7)☒ Claim(s) *11-13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/21/2006, 11/28/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 11-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In regards to dependent claim 11, prior art fails to disclose wherein an opposite pair of electrodes (Y pair) of said set of electrodes is connected to a first subset of said number of said fast electronic switches capable of switching at a repetition rate, and at least one of another oppositely positioned pair of electrodes (X pair) of said set of electrodes is connected to a second subset of said number of said fast electronic switches which has a higher voltage rating, said second subset of fast electronic switches connects said DC voltage supply to said X electrodes for ejection of said ions.

Claims 12-13 are objected to by virtue of their dependencies on the dependent claim 11.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10, 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Lines 2-3 of claim 10 recite "wherein the flight path of said time-of-flight mass spectrometer is positioned inline with the ejection path of ions" is vague

and unclear. How can the flight path of the TOF-MS be in-line with the ejection path of ions, if it is an orthogonal TOF-MS?

Claims 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. This claim is an omnibus type claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-6-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Okumura et al. (US pgPub 2003/0066958).

In regards to claim 1, Okumura et al. teach a tandem linear ion trap and time-of-flight mass spectrometer (figure 1, although a three-dimensional trap is shown here paragraph [0063] describes that this method would also be effective in a linear ion trap as well), the ion trap having a straight central axis orthogonal to the flight path of said time-of-flight mass spectrometer (the straight line axis starts at the ion source 2 through the trap 5 and into the orthogonal TOF mass orthogonal accelerator 18) and comprising; a set of electrodes (fig. 1, 15, 16, 17), at least one said electrode having a slit for ejecting ions towards said time-of flight mass spectrometer (slit in 16 and 17);a set of DC voltage supplies (41, 43

and 44) to provide discrete DC levels and a number of fast electronic switches (switches seen in dotted box 48) capable of connecting and disconnecting said DC supplies to at least two said electrodes of said ion trap ([0037]) (However note: "capable of" is non-limiting subject matter "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function" note: MPEP 2114);a neutral gas filling the volume of said ion trap in order to reduce the kinetic energy of trapped ions towards equilibrium (fig. 1, 6 note: [0076], note: it is interpreted that increasing the trapping efficiency is equivalent to reducing the kinetic energy because the ions require low energy in order to be efficiently trapped);a digital controller (fig. 1, 14) to provide a switching procedure for ion trapping, manipulations with ions, cooling and including one state at which all ions are ejected from said ion trap towards said time-of-flight mass spectrometer ([0043]-[0044])(However note: "capable of" is non-limiting subject matter "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function" note: MPEP 2114).

In regards to claim 4, Okumura et al. teach a tandem linear ion trap and time-of-flight mass spectrometer according to claim 1 wherein said neutral gas has a molecular mass smaller than the mass of ions of interest ([0076], note: helium) and said ion trap is filled with said neutral gas to a pressure in the range from 0.01mTorr to 1mTorr ([0076], note: "the degree of vacuum within the ion trap is about 1mTorr").

In regards to claim 5, Okumura et al. teach tandem linear ion trap and time-of-flight mass spectrometer according to claim 1, wherein said digital controller includes a digital processor capable of calculating an arbitrary switching sequence and control means to control a set of said number of said fast electronic switches according to said arbitrary switching sequence ([0043]-[0044], note: "the controller 14 controls the magnitudes of the voltage to be applied to the gate electrode 4, ring electrode 15, endcap electrodes 16, 17 and orthogonal accelerator 18 as well as the timings of application thereof" is interpreted to mean that the controller has both a digital processor and a means to control a set of the number of said fast electronic switches since it controls the "timing thereof" which is means it inherently has a processor).

In regards to claim 6, Okumura teaches a tandem linear ion trap and time-of-flight mass spectrometer according to claim 1, wherein said switching procedure includes a final step during which the voltages on said electrodes of said ion trap are periodically switched between a set of states and after a time sufficient for ion cooling the voltages on said electrodes of said ion trap are switched to a final said state for ejection of said ions from said ion trap (this claim is not a structural feature, but a recitation of how the switch is operated. This is non-limiting subject matter: "While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function" note: MPEP 2114).

In regards to claim 7, Okumura teaches a tandem linear ion trap and time-of-flight mass spectrometer according to further including a pulsar (fig. 1, 9), said

time-of-flight mass spectrometer having a flight path positioned orthogonally to the plane of said ejected ions (fig. 1, 18).

In regards to claim 8, Okumura teaches a tandem linear ion trap and time-of-flight mass spectrometer according to claim 7, wherein said pulsar is composed of two parallel plate electrodes, one of which is a semi-transparent mesh, each said parallel plate positioned parallel to the plane of said ejected ions ([0041]).

In regards to claim 9, Okumura teaches a tandem linear ion trap and time-of-flight mass spectrometer according to claim 7, wherein said pulsar is connected to a high voltage supply (fig. 1, 49) by a set of fast electronic switches (fig. 1, 46, 47) that are controlled by a controller (fig. 1, 14).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al. (US pgPub 2003/0066958) and further in view of Schwartz et al. (US pgPub 2005/0017170).

In regards to claim 2, Okumura et al. differ from the claimed invention by not disclosing wherein said set of electrodes comprises 4 elongated electrodes

arranged symmetrically with respect to each other, and arranged to be parallel with respect to an ion trap axis.

Schwartz et al. teach wherein said set of electrodes comprises 4 elongated electrodes arranged symmetrically with respect to each other, and arranged to be parallel with respect to an ion trap axis (fig. 1).

Schwartz modifies Okumura by teaching a form for the linear ion trap mentioned by Okurmura.

Since both Okurmura and Schwartz teach ion traps, it would have been obvious to one of ordinary skill in the art to have the form of Schwartz in the linear trap of Okurmura because the slot geometry is optimized to enable ions of different mass ranges to be scanned out of differently dimensioned slots.

In regards to claim 3, Okurmura differs from the claimed invention by not disclosing wherein said at least one electrode having a slit for ejecting ions has a surface of substantially hyperbolic shape with the centre of said slit positioned symmetrically with respect to the apex of said hyperbola.

Schwartz et al. teach wherein said at least one electrode having a slit for ejecting ions has a surface of substantially hyperbolic shape with the centre of said slit positioned symmetrically with respect to the apex of said hyperbola (fig. 1).

Schwartz modifies Okumura by teaching a form for the linear ion trap mentioned by Okurmura.

Since both Okurmura and Schwartz teach ion traps, it would have been obvious to one of ordinary skill in the art to have the form of Schwartz in the

linear trap of Okurmura because the slot geometry is optimized to enable ions of different mass ranges to be scanned out of differently dimensioned slots.

Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al. (US patent no. 7,193,207) and further in view of Okumura et al. (US pgPub 2003/0066958).

In regards to claim 14, Ding teaches a method of extracting ions (inherent in the apparatus of figure 3) from a linear ion trap (col. 3, lines 11-16), said ion trap being driven by a set of digital switches (fig. 3, 16 and 17), said method comprising the following steps; trapping said ions in said ion trap by switching between a set of trapping states defined by a set of voltage states on the electrodes of said ion trap (col. 7, lines 59-67 and col. 8, lines 1-5); and switching from a pre-selected trapping state to a final ejection state in a pre-selected time (col. 2, lines 49-62 and col. 6, lines 52-54).

Ding differs from the claimed invention by not disclosing cooling said trapped ions by collisions with a buffer gas down to equilibrium.

Okumura et al. teach cooling said trapped ions by collisions with a buffer gas down to equilibrium ([0076]).

Ding modifies Okumura by teaching a buffer gas in the ion trap.

Since both Okumura et al. and Ding teach ion traps, it would be obvious to one of ordinary skill in the art to have the buffer gas of Okumura in the trap of Ding because it would increase trapping efficiency.

In regards to claim 15, Ding further teaches where said set of trapping states consists of two states (fig. 2, V1 and V2), each of said states lasts for half of a set period (fig 2, W1 and W2).

In regards to claim 16, Ding differs from the claimed invention by not disclosing wherein said buffer gas fills said ion trap at pressures in the range from 0.01mTorr to 1mTorr.

Okumura et al. teach wherein said buffer gas fills said ion trap at pressures in the range from 0.01mTorr to 1mTorr ([0076]).

Ding modifies Okumura by teaching a buffer gas in the ion trap.

Since both Okumura et al. and Ding teach ion traps, it would be obvious to one of ordinary skill in the art to have the buffer gas of Okumura in the trap of Ding because it would increase trapping efficiency.

In regards to claim 17, Ding further teaches wherein said set period is in the range from 0.3 micro seconds to 1.0 micro seconds (fig. 2, since the waveform is time varying it is interpreted that discovering the optimum or workable ranges involves only routine skill in the art).

In regards to claim 18, Ding further teaches where the final trapping state prior to said ejection state has a duration of approximately one quarter of a set period (fig. 2, since the waveform is time varying it is interpreted that discovering the optimum or workable ranges involves only routine skill in the art).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pertinent prior art is closely related art that individually or

in combination could be considered grounds for rejection. See references cited for a listing of the pertinent prior art found and the prior art found.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL J. LOGIE whose telephone number is (571)270-1616. The examiner can normally be reached on 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./
Examiner, Art Unit 2881

/David A Vanore/
Primary Examiner, Art Unit 2881